

# Design Exercise 6

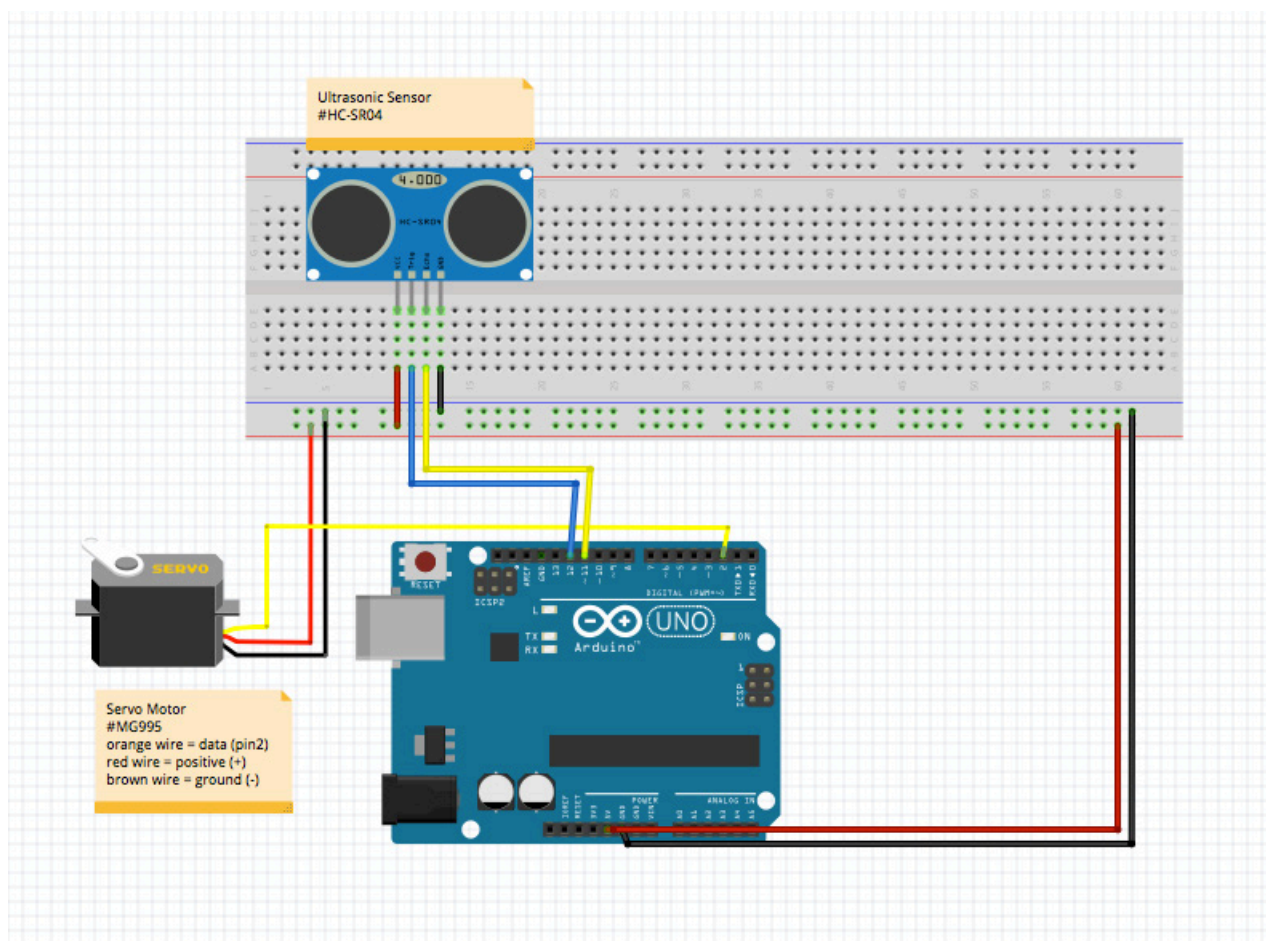
## Tasks

1. Write 250 words that critically reflect on this week's video:
2. Create a functional system with an arduino + ultrasonic sensor + servo motor

## Wiring Setup – Ultrasonic sensor + motor

In this week's exercise, you will create a system that translates proximity to movement. An ultrasonic distance sensor will control a servo motor. The input value from the sensor will be mapped, or translated, into a rotation angle, which will be output by the motor. If something, or someone, gets close to the sensor, the motor's angle of rotation will increase.

Using the diagram below, connect the ultrasonic sensor (part no: HC-SR04) to the arduino and the breadboard. Then connect the motor (part no: MG995) to the arduino. (note: the colours of the wires in diagram may not be the same as the colours of your wires.)



## Programming - Code

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```

#include <Servo.h>

int triggerPin = 12;
int echoPin = 11;

long duration;    //variable to store time to receive ultrasound
int distance;     //variable to store distance of object
int mappedRotation; // variable to store mapped value (distance > rotation)
int average = 0;
int motorPin = 2; // pin connected to servo motor

Servo myservo;

void setup() {
  pinMode(triggerPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
  myservo.attach(motorPin); // attaches the servo on servoPin to the servo object
}

void loop() {
  // Clears the triggerPin
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);

  //Sets the triggerPin on HIGH state for 10 micro seconds
  digitalWrite( triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite( triggerPin, LOW);

  // Reads the echoPin, returns the sound wave travel time in microseconds
  duration = pulseIn(echoPin, HIGH);

  // Calculates cm based on duration of ultrasound from trigger to receiver
  distance = duration*0.034/2;
  if (distance > 200) distance = 200;
  if (distance < 0) distance = 0;
  for (int i=0; i < 15; i++) {
    average = average + distance;

    //Serial.println(average);
  }
  average = average/15;
  delay(50);
  //map distance to motor rotation position (in degrees)
  mappedRotation = map(average, 0, 200, 0, 360);
  myservo.write(mappedRotation);

  // prints the distance in the Serial Monitor
  Serial.print("distance: ");
  Serial.print(distance);
  Serial.print("cm, Angle: ");
  Serial.print(mappedRotation);
  Serial.println(" deg");
}

```

### **Record your video**

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Record a 30-second video that shows:

1. *all* your hardware connections
2. your final sketch
3. the Serial Monitor output of your final sketch
4. the functioning system

Create a .zip file that contains your 30-second video and your written text about this week's reading. Upload your files to the dropbox link which will be provided at the start of next class. You cannot receive credit for this assignment if you are not present in class.

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